

REMARKS

Claims 1-12 are pending in the application, and remain rejected. Claims 1-7 and 10 are herein canceled.

Claim Rejections - 35 U.S.C. §102(e)

Claims 8 and 11 remain rejected under 35 U.S.C. §102(e) as being anticipated by Nallan et al. (US/2004/0002223).

Applicants respectfully disagree with the rejection because not all of the claimed limitations are taught by the cited reference.

Applicants note that Nallen discloses a first embodiment (paragraph [0026] to line 14 in [0027]), an alternative embodiment (lines 14-18 in [0027]), and a third embodiment (lines 18-24 in [0027]).

Applicants submit that in each embodiment, the etchant gas mixture and the passivation gas are introduced into the chamber *after* the hafnium dioxide layer 402 is formed. The passivation gas is nitrogen, as noted in paragraph [0027], line 4. The etchant gas mixture comprises, for example, a halogen gas such as Cl₂ and a reducing gas such as CO (lines 5-6 in [0027]). Therefore, the passivation gas supplying step corresponds to the step (c3) in claim 8, and the etchant gas mixture supplying step corresponds to the step (c4) in claim 8.

In Nallen's first embodiment, plasma comprising the etchant and passivation gases simultaneously etches and passivates the hafnium dioxide and the exposed silicon (lines 6-9 in [0027]). That is, the hafnium layer is etched at the same time as exposed to the passivation gas.

In Nallen's second embodiment, the passivation gas is supplied at the end of the etch process when the dielectric is nearly all removed. That is, the hafnium dioxide layer is exposed to the passivation gas plasma after it is almost etched.

In Nallen's third embodiment, the etching process comprises a main etch process and an overetch process. The passivation gas is supplied in the overetch process. That is, the hafnium dioxide layer is exposed to the passivation gas plasma *after* it is etched in the main etch process.

As noted above, Nallen does not disclose the step of exposing the hafnium dioxide layer to the passivation gas plasma (nitrogen plasma) prior to etching the hafnium dioxide layer.

If the hafnium dioxide layer 402 shown in Fig. 4a of Nallen is etched after being exposed to the passivation gas plasma, the passivated region 420 shown in Fig. 4b is not formed. In Nallen's invention, the substrate 414 must be exposed to the passivation gas plasma after the hafnium dioxide layer 402 is almost etched in order to form the passivated region 420. Therefore, the limitation that step (c3) of claim 8 is carried out before the step (c4) is not taught or suggested by the cited reference.

Claim Rejections - 35 U.S.C. 103(a)

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nallen et al. in view of Tsunashima et al. (US/2001.0023120).

Claim 9 depends from claim 8. As noted above, Applicants submit that claim 8 is patentably distinguished from the prior art. Because claim 9 is dependent from and necessarily

includes at least the limitations of claim 8, Applicants submit that claim 9 is similarly distinguished.

Claims 1-3, 7 and 10 are rejected under 35 U.S.C. 103(a) as unpatentable over U.S. Patent No. 6,150,221 to Aoyama in view of U.S. Patent No. 6,573,197 to Callegari et al.

Applicants herein cancel claims 1-7 and 10. Therefore, this rejection is moot.

Claims 4-6 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama (US/6,150,221) in view of Callegari et al. (US/6,573,197) and Tsunashima et al. (US/2001/0023120).

The Examiner asserts that with respect to claims 8 and 11, Applicants' argument that "the region of the film exposed to plasma (N, AR or NH₃) is etched *after* the plasma treatment" is not persuasive because "it is respectfully submitted that Nallan et al., as applied in Paragraph 3 above, teach all the claimed limitations including exposing of the substrate to the plasma treatment then etching of the gate dielectric layer 402 after the plasma treatment (See Figs. 4a and 4b)."

Applicants respectfully again disagree with the above rejection, because not all of the claimed steps are taught by the cited references. Applicants first note that the etching of the cited reference is not performed according to the claim, that is, "using the gate electrode as a mask, etching a portion of the gate insulating film".

Furthermore, Applicants note that the cited reference teaches using sulfuric acid to remove the insulating layer comprising zirconium oxide. However, in claim 12 the insulating film is etched not by sulfuric acid, but by a mixture of hydrogen peroxide and sulfuric acid. This etching combination is not taught or suggested by the cited reference. Applicant respectfully request withdrawal of the rejections.

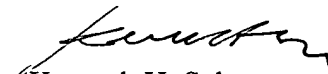
In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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